P/N 33-308100-002
June 2009

AIR Intelligence™

AIR-Intelligence™ ASD-320 Aspirating Smoke Detection System

Design, Installation, Operation and Maintenance Manual

FOREWORD

This manual, P/N 33-308100-002, is to be used by qualified and factory-trained personnel, knowledgeable of NFPA standards and any other applicable standards in effect, and is intended to provide guidance to qualified technical professionals for the installation, operation, testing and maintenance of the AIR-Intelligence™ ASD-320 Air Sampling Detector, referred to in this manual as the "ASD-320" or the "detector."

Only qualified persons experienced, trained and certified in the installation of this equipment should design, service, maintain, test, install, and configure the ASD-320. They must be familiar and experienced with the wiring diagrams and components, electrical installation, and familiar not only with NEC, relevant NFPA and local codes but also trained and qualified by the manufacturer and/or its associated operating companies. The manufacturer of the components that make up the ASD-320 is not responsible for its configuration or installation of the product.

It is the responsibility of the professional installer (described above) to properly install, configure and test the systems. Under no circumstances will the manufacturer be liable for improper installation, maintenance, servicing, testing or configuration of the systems.

The technical data contained herein is provided for informational purposes only and should not be used as a substitute for professional judgment and training. Although the manufacturer believes this information to be true and correct, it is published and presented without any guarantee or warranty whatsoever. The manufacturer disclaims any liability for any use of the data other than as set out in this manual, foreword included.

Any questions concerning the information presented in this manual should be addressed to:

AIR-Intelligence
400 Main Street
Ashland, MA 01721 USA
Customer Service: (508) 881-2000
Technical Support: (866) 287-2531
Website: *www.air-intelligence.com*

PRODUCT SYMBOLS

This symbol appears on the main board of the unit and indicates that the board contains static sensitive components.

This label is located on the laser chamber at the bottom right of the open detector and signifies that the unit is a Class 1 Laser product as specified in IEC 60825-1. The unit incorporates a Class 3B embedded laser which must not be removed from the detector, as retinal damage may result if the laser beam enters the eye.

This symbol indicates the Safety ground studs. These are for grounding cable screens, etc., and should not be connected to 0V or signal earth.

AIR-Intelligence has taken every care to ensure that the ASD-320 is as simple to install as possible, but in case of difficulty, please contact Technical Support at (866) 287-2531.

EXAMPLE

Entries shown as **EXAMPLE** represent function buttons on the front of the detector. For example: **TEST** represents the **TEST** function button.

TERMS AND ABBREVIATIONS

°C:	°Centigrade
°F:	°Fahrenheit
A:	Ampere
AC:	Alternating Current
ADA:	Americans with Disabilities Act
AH:	Ampere Hour
AHJ:	Authority Having Jurisdiction
ARC:	Automatic Release Circuit
AWG:	American Wire Gauge
CSFM:	California State Fire Marshal
DACT:	Digital Alarm Comm. Transmitter
DC:	Direct Current
DET:	Detector
EOLD:	End of Line Device
EOLR:	End of Line Resistor
FM:	Factory Mutual
ft.:	Feet
HSSD:	High Sensitivity Smoke Detector
Hz:	Hertz (Frequency)
in.:	Inch
LCD:	Liquid Crystal Display
LED:	Light Emitting Diode
MEA:	Materials and Equipment Acceptance Division of the City of New York
NAC:	Notification Appliance Circuit
N.C.:	Normally Closed
NEC:	National Electrical Code
NFPA:	National Fire Protection Association
N.O.:	Normally Open
NYC:	New York City
PCB:	Printed Circuit Board
pF:	Pico-farads
P/N:	Part Number
PSU:	Power Supply Unit
RAM:	Random Access Memory
SLC:	Signaling Line Circuit
TB:	Terminal Block
UL/ULI:	Underwriters Laboratories, Inc.
V:	Volts
Vac:	Volts AC
Vdc:	Volts DC
VRMS:	Volts Root Mean Square

CAUTIONS AND WARNINGS

CAUTION

A caution identifies a procedure, practice, or statement, which, if not strictly followed, could result in programming errors, impairment of equipment operation, or equipment damage.

WARNING

A warning identifies an operating or maintenance procedure, practice, condition or statement, which, if not strictly followed, could result in personal injury or death.

SAFETY SUMMARY

This entire manual must be read and understood before installation.

Installation Precautions

Adherence to the following will aid in problem-free installation with long-term reliability:

Several different sources of power can be connected to this detector.

WARNING

Disconnect all sources of power before servicing. Control unit and associated equipment may be damaged by servicing while the unit is energized. Do not attempt to install, service, or operate this control unit until this manual is read and understood.

System Re-acceptance Test after Re-Programming: **To ensure proper system operation, this system must be retested in accordance with NFPA 72 Chapter 10 after any programming change. Re-acceptance testing is also required after any addition or deletion of system components, and after any modification, repair or adjustment to system hardware or wiring.**

CAUTION

All components, circuits and system operations known to be affected by a change must be 100% tested. In addition, to ensure that other operations are not inadvertently affected, at least 10% of initiating devices in a single installation that are not directly affected by the change, up to a maximum of 50 devices, must also be tested and proper system operation verified, in accordance with NFPA.

This system meets FM and UL 268 requirements for operation at 14° to 100.4°F (-10° to 38°C) and at a relative humidity of 90% (non-condensing) @ 90°F (32.2°C). However, the useful life of the system's standby batteries and the electronic components may be adversely affected by continuous operation at these environmental limits. Therefore, it is recommended that this system and its peripherals be installed in an environment with a nominal room temperature of 60° to 80°F (15° to 27°C).

This equipment is Class 111 as defined in EN60950 (i.e., this equipment is designed to operate from Safety Extra Low Voltages and does not generate any hazardous voltages).

Like all solid-state electronic devices, this system may operate erratically or can be damaged when subjected to lightning induced transients. Although no system is completely immune from lightning transients and interference, proper grounding will reduce susceptibility.

WARNING

The use of overhead or outside aerial wiring is not recommended due to the increased susceptibility to nearby lightning strikes. Consult with the Technical Support Department if any problems are anticipated or encountered.

Do not install electronic assemblies prior to mounting and attaching conduit for field wiring to the enclosure. Before making modifications, verify that they will not interfere with battery and printed circuit board locations. Do not overtighten screw terminals. Overtightening may damage threads, resulting in reduced terminal contact pressure and difficulty with screw terminal removal.

This system contains static-sensitive components. Always ground yourself with a proper wrist strap before handling any circuits so that static charges are removed from the body. Use static suppressive packaging to protect electronic assemblies removed from the control unit.

Follow the instructions in this manual. These instructions must be followed to avoid damage to the control unit and associated equipment. System operation and reliability depend upon proper installation.

CAUTION **While installing a fire alarm system may make lower insurance rates possible, it is not a substitute for insurance. An automatic fire alarm system or components of a system—such as smoke detectors, heat detectors, manual pull stations, notification appliances, and a fire alarm control unit with remote-notification capability—can provide early warning of a developing fire. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire**.

ASPIRATING SMOKE DETECTION SYSTEM LIMITATIONS

An Aspirating Smoke Detection system—which can be made up of smoke detectors, heat detectors, manual pull stations, notification appliances, and a fire alarm control unit with remote-notification capability—can provide early warning of a developing fire. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire.

Any fire alarm system may fail for a variety of reasons. The following are only examples:

- Smoke detectors may not sense fire where smoke cannot reach the detectors, such as in chimneys, in walls, on roofs, or on the other side of closed doors.
- Smoke detectors on one level also may not sense a fire on another level or floor of a building. A second floor detector, for example, may not sense a first floor or basement fire.
- All types of smoke detectors, both ionization and photoelectric, have sensing limitations. No type of smoke detector can sense every kind of fire caused by carelessness and safety hazards such as smoking in bed, violent explosions, escaping gas, improper storage of flammable materials, overloaded electrical circuits, children playing with matches, or arson.
- Notification appliances, such as bells, may not alert people if these appliances are located on the other side of closed or partly open doors, or are located on another floor of a building.
- A fire alarm system will not operate without electrical power. If AC power fails, the system will operate from standby batteries only for a specified time.
- Rate-of-Rise heat detectors may be subject to reduced sensitivity over time. For this reason, the rate-of-rise feature of each detector should be tested by a qualified fire protection specialist as recommended in NFPA 72.
- Auxiliary Equipment used in the system may not be technically compatible with the control unit. It is essential to use only equipment listed for service with your control unit.
- Telephone lines needed to transmit alarm signals from a premise to a central monitoring station may be out of service or temporarily disabled.

The most common cause of fire alarm malfunctions is inadequate maintenance. All devices and system wiring should be tested and maintained by professional fire alarm installers following written procedures supplied with each device. System inspection and testing should be scheduled monthly or as required by national and/or local fire codes and standards. Adequate written records of all inspections should be kept.

GENERAL SAFETY NOTICES

The following general safety notices supplement specific warnings and cautions appearing in the manual. The safety precautions in this section must be understood and applied during operation and maintenance. This manual is to be used by trained distributors/technicians. The entire manual must be read and fully understood prior to installation.

FIRST AID

Any injury, no matter how slight, should never go unattended. Always obtain first aid or medical attention immediately.

GENERAL PRECAUTIONS

The following general safety precautions are to be observed at all times:

1. All electrical components associated with equipment should be installed and grounded in accordance with NEC and local regulatory requirements.
2. Special precautionary measures are essential to prevent applying power to equipment at any time maintenance work is in progress.
3. Before working on electrical equipment, use a voltmeter to ensure that the system is not energized.
4. When working near electricity, do not use metal rulers, flashlights, metallic pencils, or any other objects having exposed conductive material.
5. When connecting a meter to terminals for measurement, use a voltage range higher than expected voltage to be measured.

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CHAPTER 1
PRODUCT AND COMPONENT DESCRIPTIONS

1-1 INTRODUCTION

The AIR-Intelligence™ ASD-320 is a highly sophisticated "next generation" High Sensitivity Aspirating Smoke Detection product that provides all the benefits of air sampling high sensitivity smoke detection, including very early warning. Designed for easy installation and commissioning, the ASD-320 incorporates a patented "artificial intelligence" known as ClassiFire®, which allows the Detector to configure itself to optimum sensitivity, alarm thresholds, and minimum nuisance alarms for various environments.

ClassiFire intelligence also monitors the Detector chamber and dust separator (filter) for contamination, continually adjusting the appropriate operating parameters to counteract the negative effects of any contamination. AIR-Intelligence Detectors are unique in being able to provide a consistent level of protection in a very wide range of environments by continuously making minor adjustments to sensitivity.

The AIR-Intelligence line of Detectors detects "difficult-to-detect" slow growth electrical overload incipient fires in "difficult" environments.

This manual gives information likely to be needed for most installations, but for more detailed information on subjects such as programming, networking and pipe networks, please refer to:

- the *SenseNET™ Software User's Guide*, *Remote Configuration Software User's Guide;* and
- *PipeCAD™ Design, Installation and Software Manual*

This equipment is Class 111 as defined in EN60950 (i.e., this equipment is designed to operate from Safety Extra Low Voltages and does not generate any hazardous voltages).

This label is located on the laser chamber and signifies that the unit is a Class 1 Laser product as specified in IEC 60825-1. The unit incorporates a Class 3B embedded laser which must not be removed from the Detector, as retinal damage may result if the laser beam enters the eye.

If this equipment is part of a fire detection system, it should be supplied from an approved U.L. power supply designed for fire system use.

1-2 AVAILABLE SOFTWARE FOR THE ASD-320

Two software packages are available for use with the ASD-320:

- **Remote Configuration** - Provided free of charge with every AIR-Intelligence Detector, this software package enables the user to set up and configure the programmable functions of one or more Detectors or Command Module from a computer connected via an RS232 serial cable. Note that the ASD-160H and ASD-320 Detectors must be configured remotely using either the Remote Configuration or SenseNET software, whereas an ASD-640 Detector can be configured using its front panel keys and display.

- **SenseNET** - This software is available for purchase from AIR-Intelligence. SenseNET software can configure and manage a large network of Detectors with a simple, streamlined graphical user interface from a computer connected to a Detector or Command Module via an RS232 serial cable to RS485 converter interface.

1-3 SPECIFICATIONS

CAUTION **This equipment is only to be used in accordance with this specification. Failure to operate the equipment as specified may cause damage to the unit, injury or property damage.**

Table 1-1. Specifications

Specification	Value
SELV rating (EN 60950)	Class III
Supply Voltage	21.6V - 26.4V DC
Size	300 W x 220 H x 90 D (mm) 11.8 W x 8.6 H x 3.5 D (in.)
Weight	8.4 lbs. (3.8 kg) with docking station
Operating temperature range	32° to 100°F (0° to 38°C) (UL 268 compliance)
Operating humidity range	0 - 90% Non Condensing BS EN 61010-1 Pollution degree 1 BS EN 61010-1 Installation Cat. II
Sensitivity range (Obs/ft)	Min = 25% Max = 0.03% FSD
Maximum sensitivity resolution	0.0015% Obs/m
Detection principle	Laser light scattering mass detection
Particle sensitivity range	0.0003μm to 10μm
Current consumption	400mA
Relay contact rating	500mA @ 30V
Maximum sampling pipe length	330 feet (100 meters) total
Sampling pipe inlets	3
Sampling pipe internal diameter	15-25mm {Adapters are required for pipes <1 inch (27mm) O.D. pipe}
Alarm levels	4 (Fire 2, Fire 1, Pre-Alarm and Aux) 1 relay as standard, others available
Chamber service intervals	Greater than 8 years (depending on environment)
Dust separator (filter) replacement intervals	Greater than 5 years (depending on environment)
Laser lifetime (MTTF)	Greater than 1000 years
Programming	PC via RS232/RS485
Data bus cable	RS485 data cable
Data bus length	3/4 mile (1.2 km)
IP rating	IP50

1-4 FEATURES

The following is a list of major features of the ASD-320:

- Patented “artificial intelligence” known as ClassiFire
- Laser Dust Discrimination (LDD^{TM})
- 330 feet (100 m) of pipe length
- Self-adjusting between the range of 0.05% and 2.0% obscuration
- Network compatible with other AIR-Intelligence detectors and Command Module

1-5 INDICATORS

Figure 1-1 shows the three indicators on an ASD-320 Detector.

Figure 1-1. ASD-320 Indicators

1. **Fire**: Illuminates when the alarm level has been reached and the appropriate time delays have expired.
2. **Fault**: Illuminates when the unit has a fault and a fault signal is being sent to the fire alarm panel.
3. **OK**: Illuminates to show normal operation when there are no faults. The OK lamp will flash during the 15-minute FastLearn^{TM} period when the Detector is first learning about its environment.

1-6 INSIDE THE ASD-320 DETECTOR

Figure 1-2 shows the main interior parts of a Detector with the cover off:

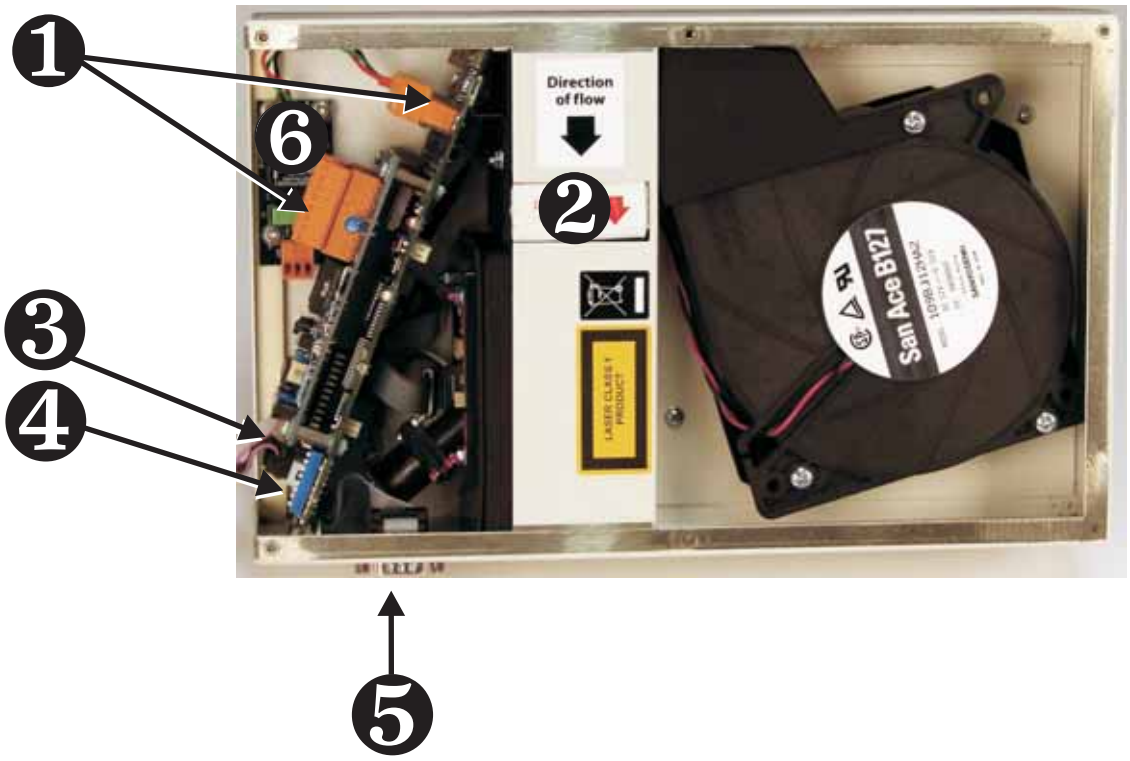

Figure 1-2. ASD-320 Detector Interior View

1. Removable terminal block connections
2. Dust separator (filter)
3. Addressable Programmable Interface Card (APIC) or relay card port
4. Detector address DIP switch
5. RS232 serial port
6. Power filter board

1-7 REMOVABLE TERMINAL BLOCK CONNECTIONS

Figure 1-3 shows the terminal block connections that connect the ASD-320 to other electronic components.

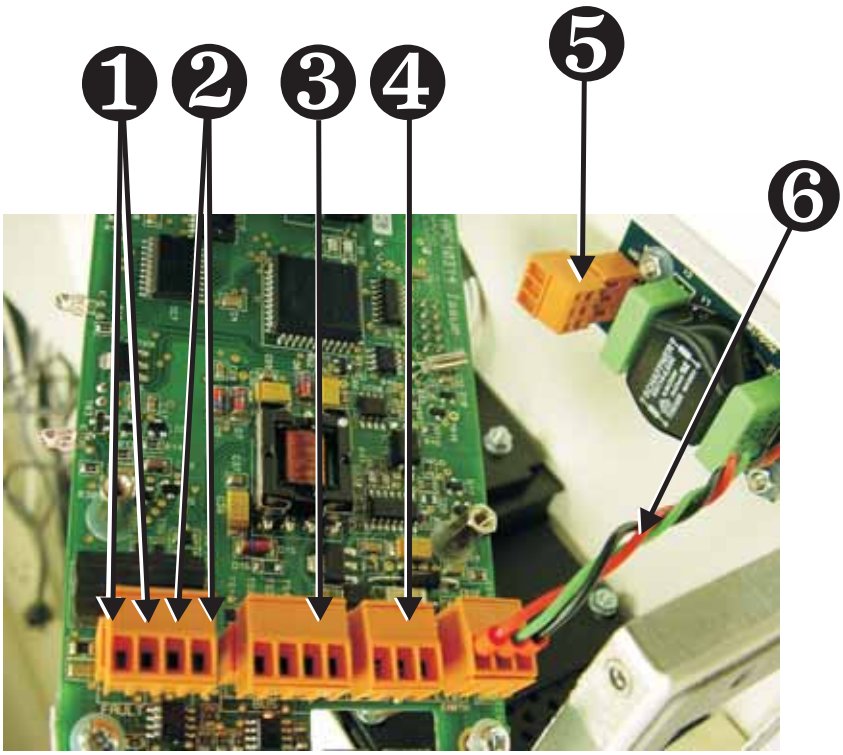

Figure 1-3. Detector Terminal Block Connections

1. Normally closed FAULT relay contacts
2. Normally open FIRE relay contacts
3. APIC addressable bus connections for use in conjunction with interface card
4. RS485/SenseNET connections
5. Power supply connections
6. Connection from power filter

1-8 RELAY CONNECTIONS

The ASD-320 includes a Fire relay (corresponding to the FIRE 1 alarm level), which closes on alarm, and a general Fault relay, which opens on any fault condition or on power-down (as shown in Figure 1-4).

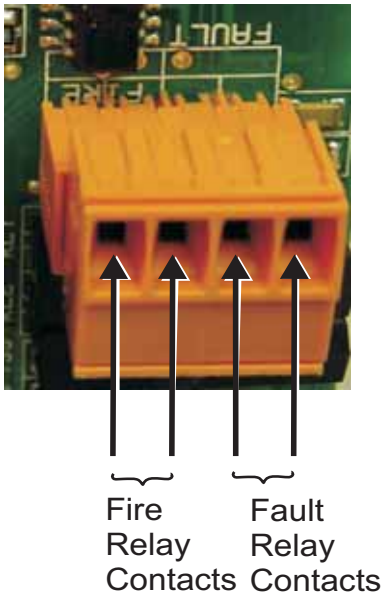

Figure 1-4. Fault and Fire Relay Contacts

The relays are of the volt-free type, with a maximum current capacity of 500mA at 30V DC. To comply with radiated immunity requirements, it is recommended that the relay connection wires be looped once around a suppression ferrite (provided). There should be about 1-1/4 inch (30 mm) of wire between the end of the ferrite and the terminal block to give adequate stress relief. To achieve this, it is necessary to strip back the cable screen approximately 5 inches (130 mm). The screen should be terminated under the cable gland cap (as shown in Figure 1-5).

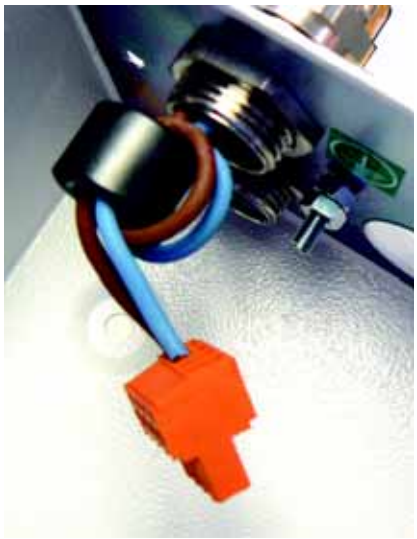

Figure 1-5. Looping Relays Connection Wires Around a Suppression Ferrite

1-9 DOCKING STATION

The basic principle behind installation of the ASD-320 is that all wiring and pipework is installed using a docking station. This is a convenient feature which means that the Detector can be dismounted or replaced without disturbing any wiring or installed pipework.

A Piped Exhaust docking station includes a third port which allows the Detector exhaust air to be taken back to the area of different atmospheric pressure from which the inlet is sampling (Refer to Figure 1-6).

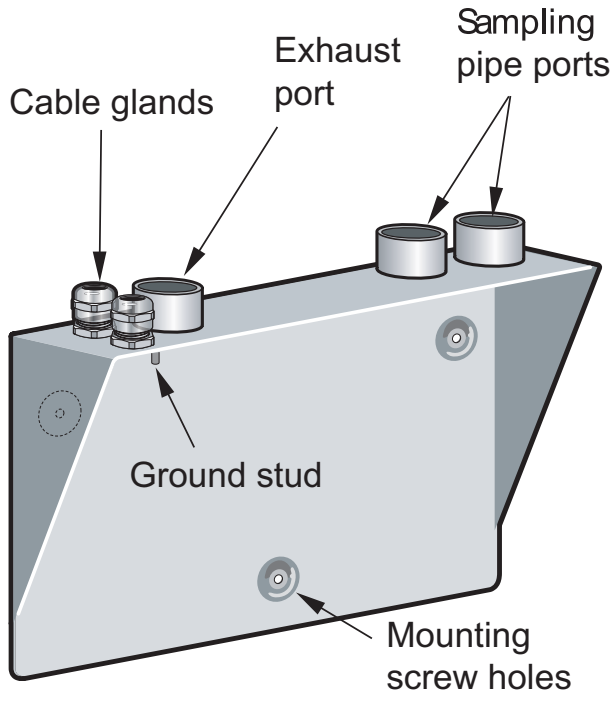

Figure 1-6. Two Port Docking Station with Piped Exhaust

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CHAPTER 2
INSTALLATION AND CONFIGURATION

2-1 INTRODUCTION

This chapter provides information necessary to install the AIR-Intelligence™ ASD-320 system. Installation consists of the following steps:

1. Unpack the shipping carton. Ensure that the package contains a CD-ROM, one ferrite ring, two cable glands, and the unit.
2. Determine the optimum location for the Detector.
3. Mount APIC card or Relay card inside the Detector, if required.
4. Mount the docking station.
5. Connect the docking station to the sampling pipe network.
6. Mount the Detector to the docking station.

Installation should only be done by factory-trained technicians in accordance with applicable installation requirements. These include:

(1) NFPA-70 (National Fire Protection Association)

(2) NFPA-72

(3) Any other national or local installation requirements or standards.

Note: Power should be turned off during installation.

2-2 ANTISTATIC PRECAUTIONS

This system contains static-sensitive components. Always ground yourself with a proper wrist strap before handling any circuits.

When handling any electric components or printed circuit boards, antistatic precautions must be followed. Failure to do so may result in component damage.

Electro-static discharge can be reduced by adhering to the following guidelines:

1. Always use conductive or antistatic containers for transportation and storage, if returning any item.
2. Wear a wrist strap while handling devices and ensure a good ground is maintained throughout the installation process.
3. Never subject a static sensitive device to sliding movement over an ungrounded surface and avoid any direct contact with the pins or connections.
4. Avoid placing sensitive devices onto plastic or vinyl surfaces.
5. Minimize the handling of sensitive devices and Printed Circuit Boards (PCBs).

2-3 GENERAL INSTALLATION GUIDELINES

The following is a brief set of guidelines on installing Detectors:

1. The Detector should normally be mounted at a level where there is easy access to the RS232 serial port for configuration and programming.
2. Unused sampling pipe inlet must be closed if only one sampling pipe is used.
3. The exhaust air from the unit must not be impeded in any way. If the unit is mounted in a different air pressure from where the air is being sampled (for example an air duct), then a pipe must be routed from the exhaust port back to the same air pressure zone as the sampling holes.
4. All wiring shall comply with NEC, NFPA-70, and the requirements of the local AHJ. All signal cables must be suitable for the application.
5. The unit must not be placed in areas where either the temperature or humidity is outside the specified operating range.
6. The unit should not be placed in close proximity to any equipment expected to generate high Radio Frequency levels (such as radio alarms) or units generating high levels of electrical energy (such as large electric motors or generators).

2-4 APPLICATION

The ASD-320 is intended to provide small area incipient fire detection. This means that it is suitable for the substantial range of applications typified by small compartmentalized rooms, warehouse racking, or pieces of electronic or electromechanical equipment where it is desirable to achieve individual incipient fire reporting. In compartmentalized rooms, each compartment would normally use an individual AIR-Intelligence detector.

The ASD-320 is *not* intended to protect large areas, or to sample from areas where there may be any difference in airflow rates or pressure differentials. If detection in environments conforming to these descriptions is required, other AIR-Intelligence products should be used.

2-5 SYSTEM DESIGN

Simple designs with short sampling pipes produce the best results. Complex sampling pipe runs should be avoided with the ASD-320 detector. The use of 'T' branch pipes is not recommended. Maximum recommended sampling pipe length is 165 feet (50 meters) per pipe.

Note: PipeCAD™ pipe modeling software must be used when designing a pipe network and verifying its performance. Refer to the *PipeCAD Design, Installation and Software Manual* or complete instructions on how to design and install an air sampling pipe network.

Always locate the sampling points in positions to which smoke may reasonably be expected to travel. For example, do not expect ceiling mounted sampling points to operate satisfactorily if air flow from air-conditioning systems keeps the cool smoke from an incipient fire from reaching ceiling level. In this instance, it is usually better to locate the sampling pipe directly in the airflow (for example, across the return air register of an air conditioning unit).

Note: There is no substitute for carrying out smoke tests prior to installation of pipework to indicate suitable sampling point location.

No more than one Air Handling Unit may be protected with one ASD-320 detector. In this application, ensure that the sampling pipe is raised clear of high velocity air in the immediate vicinity of the air intake grill on stand-off posts as shown in Figure 2-1.

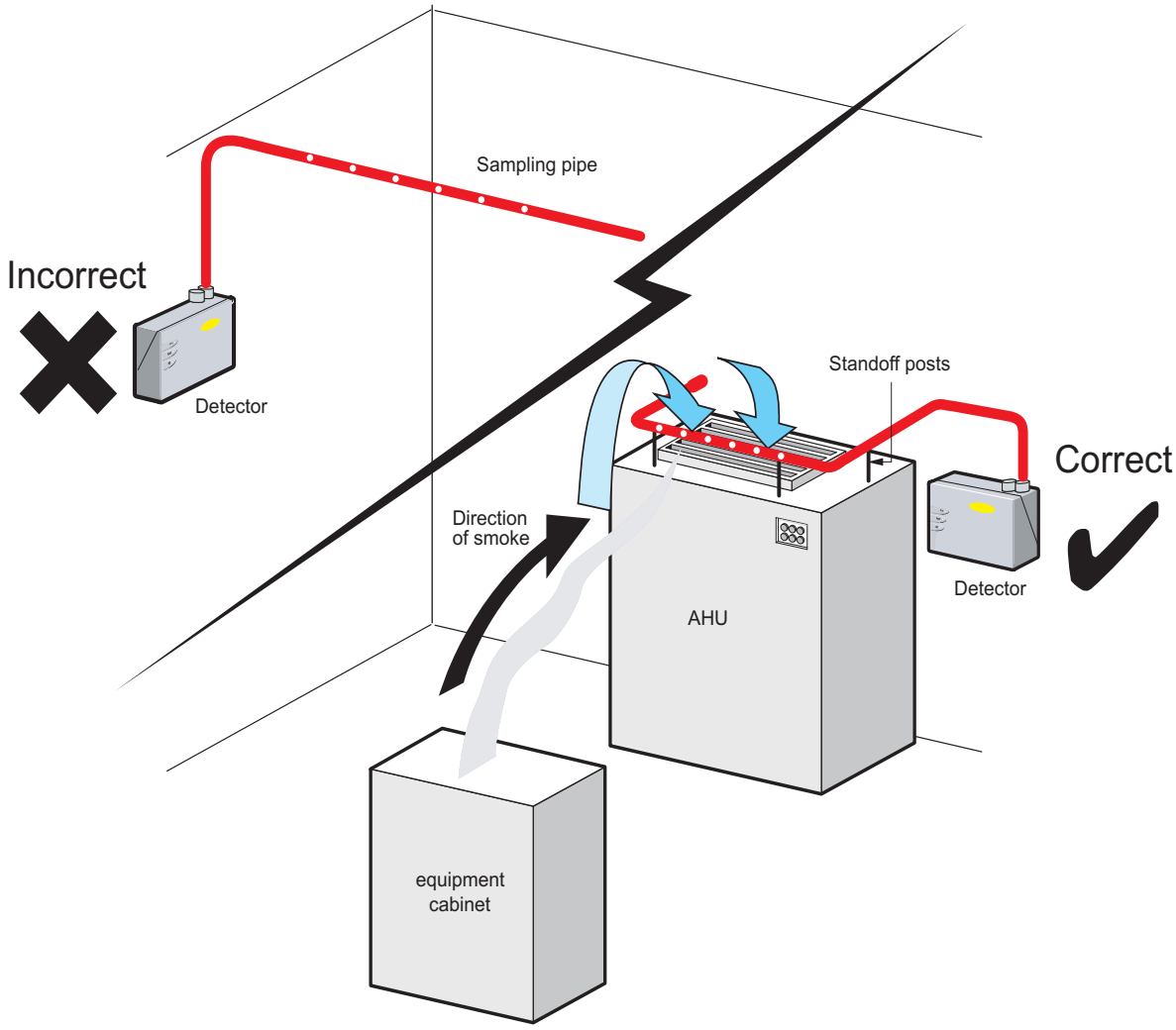

Figure 2-1. Air Handling Unit In Vicinity of ASD-320 Detector

2-5.1 Agency Design Requirements

UL268 fire tests were passed with an installation as follows:

- Total Sampling Pipe Length: 302 ft (single pipe)
- Number of Sampling Holes: 4
- Worst-Case Sampling Hole Sensitivity, as indicated by PipeCAD: 4.97% obs/ft.*
- Alarm Factor: 8
- Fire 1 Alarm Delay: 0 seconds

These settings gave satisfactory responses to the test fires in 120 seconds or better. For the purposes of UL268 compliance, these should be regarded as worst case values. Layouts should be planned in PipeCAD and the indicated worst-case hole sensitivity should be between 0.5% and 4% obs/ft.*, except in special applications where the detector can be set to be more sensitive than 0.5%. Commissioning smoke tests should be performed to ensure that the farthest sampling hole from the detector is capable of generating a fire alarm within 120 seconds of receiving smoke.

ULC-S529-02 fire tests were passed with an installation as follows:

- Total Sampling Pipe Length: 302 ft (single pipe)
- Number of Sampling Holes: 2
- Worst-Case Sampling Hole Sensitivity, as indicated by PipeCAD: 0.51% obs/ft.*
- Alarm Factor: 8
- Fire 1 Alarm Delay: 7 seconds

These settings gave satisfactory responses to the test fires in 120 seconds or better. For the purposes of ULC529-2 compliance, these should be regarded as worst case values. Layouts should be planned in PipeCAD and the indicated worst-case hole is more sensitive than 0.51% obs/ft.* Commissioning smoke tests should be performed to ensure that the farthest sampling hole from the detector is capable of generating a fire alarm within 120 seconds of receiving smoke.

***Note:** The results should be verified at installation by entering the installed detector's Fire 1 sensitivity (as indicated in the remote software histogram screen) into the PipeCAD **Options**>**Calculation Options**>**Detector Sensitivity** field and recalculating the layout results.

2-5.2 Piped Exhaust Docking Station

The ASD-320 is supplied with a "Piped Exhaust" type Docking Station (as shown in Figure 1-6). This allows the ASD-320 detector to sample from areas which may be at different air pressure from the detector location. Typical uses are for air duct sampling and allowing the installation of the detector in under-floor or ceiling voids or when sampling from pieces of computer-related equipment.

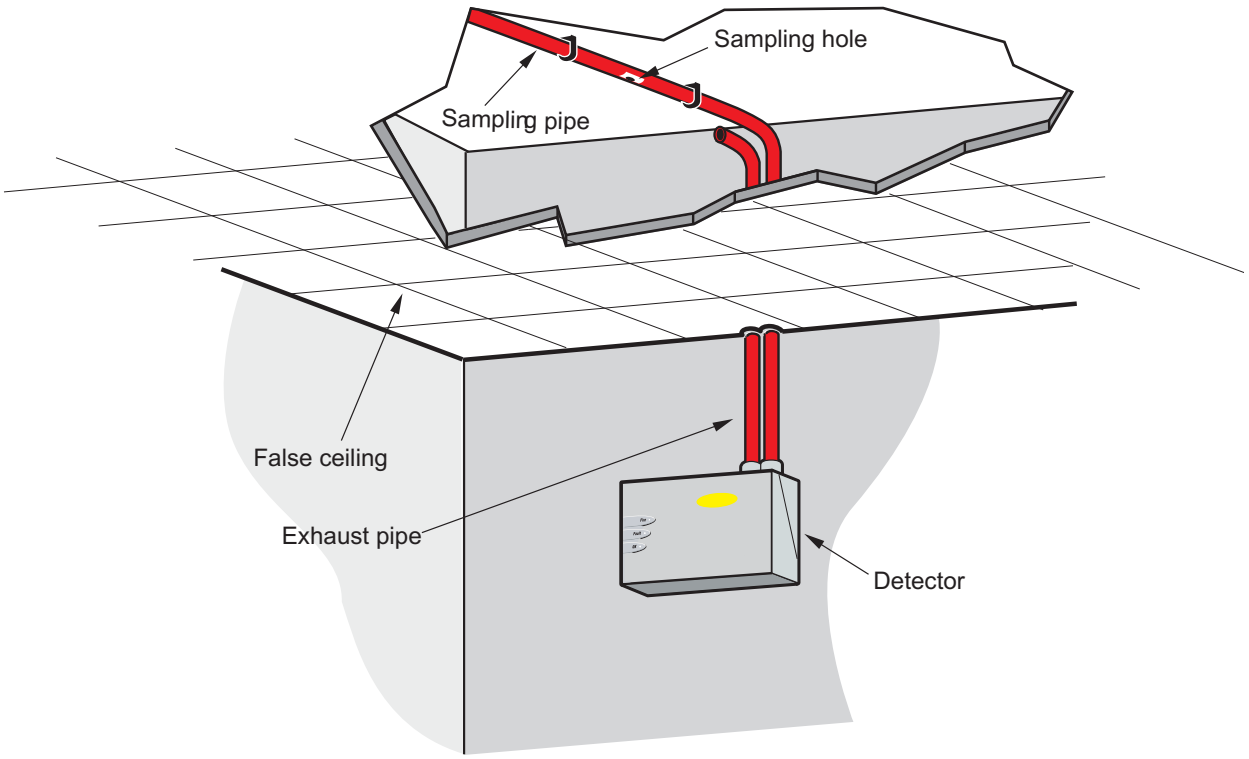

Figure 2-2. Installation of Pipework Above Ceiling with Exposed Detector (Piped Exhaust)

Note: The Two Port with Exhaust Pipe docking station needs to be used in the configuration shown in Figure 2-2.

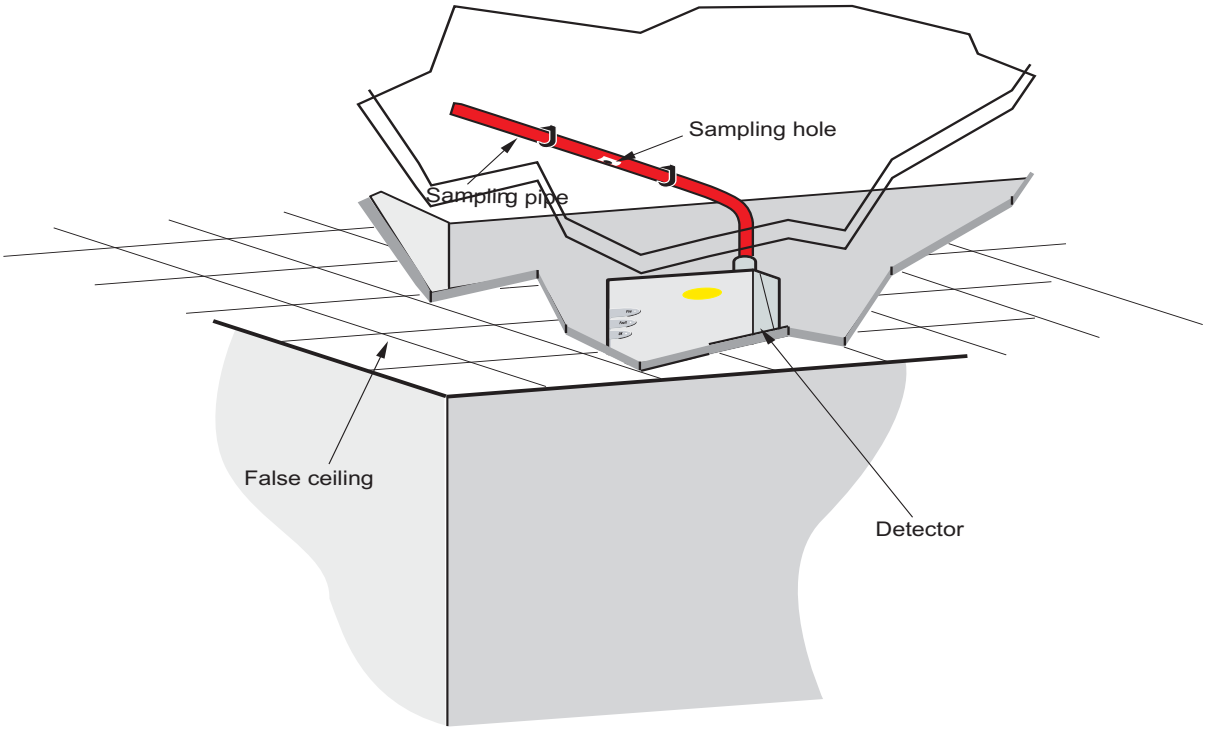

Figure 2-3. Installation of Pipework Above Ceiling with Detector Mounted in Ceiling Void (No Exhaust Piping)

Table 2-1 contains a non-exhaustive list of procedural guidelines for installation of the ASD-320.

Table 2-1. Procedural Guidelines

	Do		Don't
✓	Ensure that the ClassiFire® alarm factor is appropriately set.	X	Drop the Detector.
✓	Ensure that the power and signal cables are correctly connected before powering up by use of cable identifiers or electrical continuity checks. Incorrect connection could damage the Detector.	X	Install Detectors in damp or exposed areas.
✓	Ensure that cable of an appropriate approved type is used for interconnection.	X	Remove or connect boards when the Detector is powered up.
✓	Place sampling points so that the Detector will be able to detect smoke at the earliest opportunity.	X	Connect internal 0 volt terminals to local earth.
✓	Ensure that the Detector exhaust is in an area with the same atmospheric pressure as the sample pipes, either by placing the Detector physically in the protected area or by leading a pipe from the Detector exhaust to the protected area	X	Attempt to re-use dust separator (filter) cartridges once removed.
✓	Ensure that the environment of the protected area is within the environmental operating parameters of the Detector (32º to 100º F or 0º to 38ºC), humidity 0 - 90%, non-condensing).	X	Attempt to adjust or alter Detector settings other than via the user-programmable functions. Any attempts to adjust the laser potentiometer are detectable and will void the warranty on the product.
✓	Close unused pipe inlet ports on the Detector to ensure optimal operation.	X	Place the Detector near high power RF sources.
✓	Set the appropriate ClassiFire alarm factor for the area to be detected.	X	Place the Detector so close to other equipment that there is insufficient room to access and change the dust separator (filter) or access the RS232 connector.
✓	Set the Detector Address Switches correctly when used in a network.	X	Use sampling pipe of less than 1 inch (27 mm) outside diameter without a suitable 1-inch (27-mm) pipe adapter. It is important that there are no leaks where the pipe connects to the Detector.
		X	Use excessive force when fitting sampling pipes as this may damage the Detector.

2-6 MECHANICAL INSTALLATION

The docking station is connected to the installed sampling pipework and fixed to the mounting surface using three screws of a type appropriate to the mounting surface. Ensure that the sampling and/or exhaust pipes are securely seated in the pipe ports before securing. If using a piped exhaust docking station, be sure that the sampling and exhaust pipes are fitted into the relevant ports as shown in Figure 1-6 of Chapter 1.

2-7 REMOVING THE FRONT COVER

To remove the front cover, unfasten the six attachment screws on the front of the unit. The cover may then be removed.

2-8 ELECTRICAL INSTALLATION

The ASD-320 Detector is supplied with removable terminal blocks (Refer to Figure 1-3 of Chapter 1). These may be removed from their sockets by lifting them up at right angles to the circuit board.

Take note of the orientation of each terminal block and its function before removing it. It may also be beneficial to mark the connection wires with suitable identification labels or colored rings to aid in the connection process.

CAUTION **All connections should be made with the power turned off.**

2-9 POWER SUPPLY CONNECTIONS

The power supply cable should be the shielded (screened) type and should be led through the metal cable gland provided, leaving about 1-1/4 inch (35 mm) of the cable extending from the bottom of the cable gland. Depending on the type of cable used, it may be necessary to increase the diameter of the cable with sleeving or insulating tape to ensure that the cable is firmly held when the cable gland is fully tightened.

1. Remove the ASD-320 front cover by unfastening the four attachment screws.
2. Locate the power supply terminal block, mounted on the small fan relay board (inside the Detector at the left of the unit). Refer to Figure 2-4 for the location of the power supply terminal block/fan relay board.
3. Detach the power supply terminal block.

Note: It is important to be aware of the orientation of the terminal block before removing it.

4. Connect 0V and +24VDC to the “0V” and “24V” screw terminals respectively.
5. Connect the shielded (screened) wire to the ground stud on the docking station.
6. Connect a second wire from the “Earth” terminal to the docking station ground stud. Figures 1-6 shows the location of the ground stud for both types of docking stations.
7. Connect the ground wires to the ground stud.
8. Replace the terminal block with the same orientation as when removed.

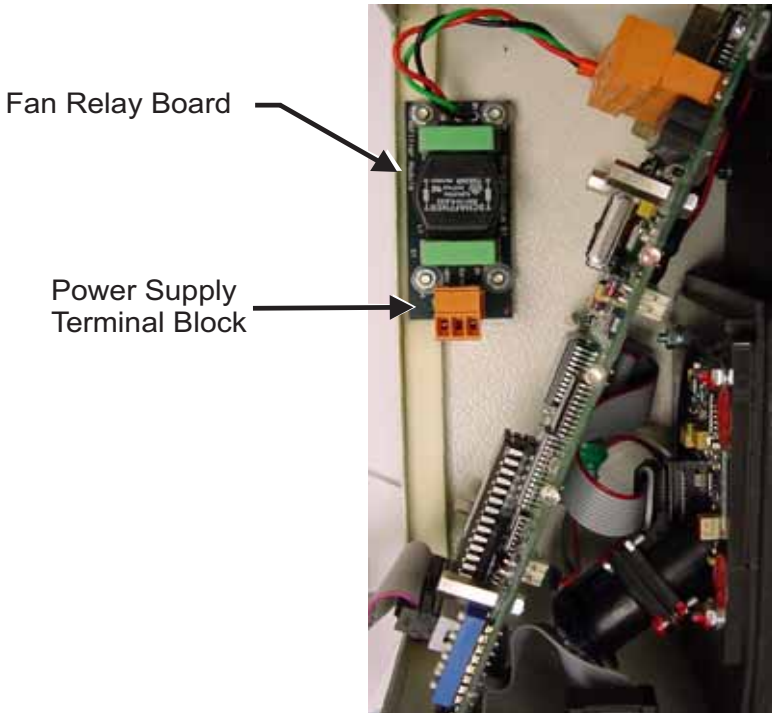

Figure 2-4. ASD-320 Power Supply Terminals

2-10 SIGNAL CONNECTIONS

To connect the signal wire:

1. Lead a suitable wire type (RS485 cable 9841, 120 ohm shielded (screened) twisted pair or equivalent) through the second cable gland.
2. Tighten it into position with approximately 1-1/4 inch (35 mm) of cable from the bottom of the cable gland.
3. Remove either the three-way terminal block next to the power supply socket (if connecting the Detector to a SenseNET™ system) or the four-way “Bus” terminal block (if connecting the Detector to an alarm panel in conjunction with the APIC addressable bus card). Refer to Figure 2-5 for an illustration of the terminals and Section 2-13 for details on addressing.

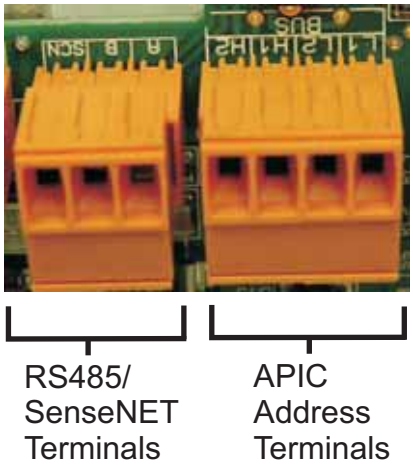

Figure 2-5. APIC Address and RS485/SenseNET Terminals

For example, in a networked system using screened cable, connect the screen wire(s) to the "SCN" terminal, Bus A wire(s) to the "A" terminal and Bus B wire(s) to the "B" terminal.

If the Detector is in the middle of a networked chain (with input and output connections) it may be more convenient to link the common Bus A, Bus B, and screen wires to single A, B and screen wires for linking to the terminal block.

Figure 2-6 shows the power and signal connections to the docking station for connection to a single network cable.

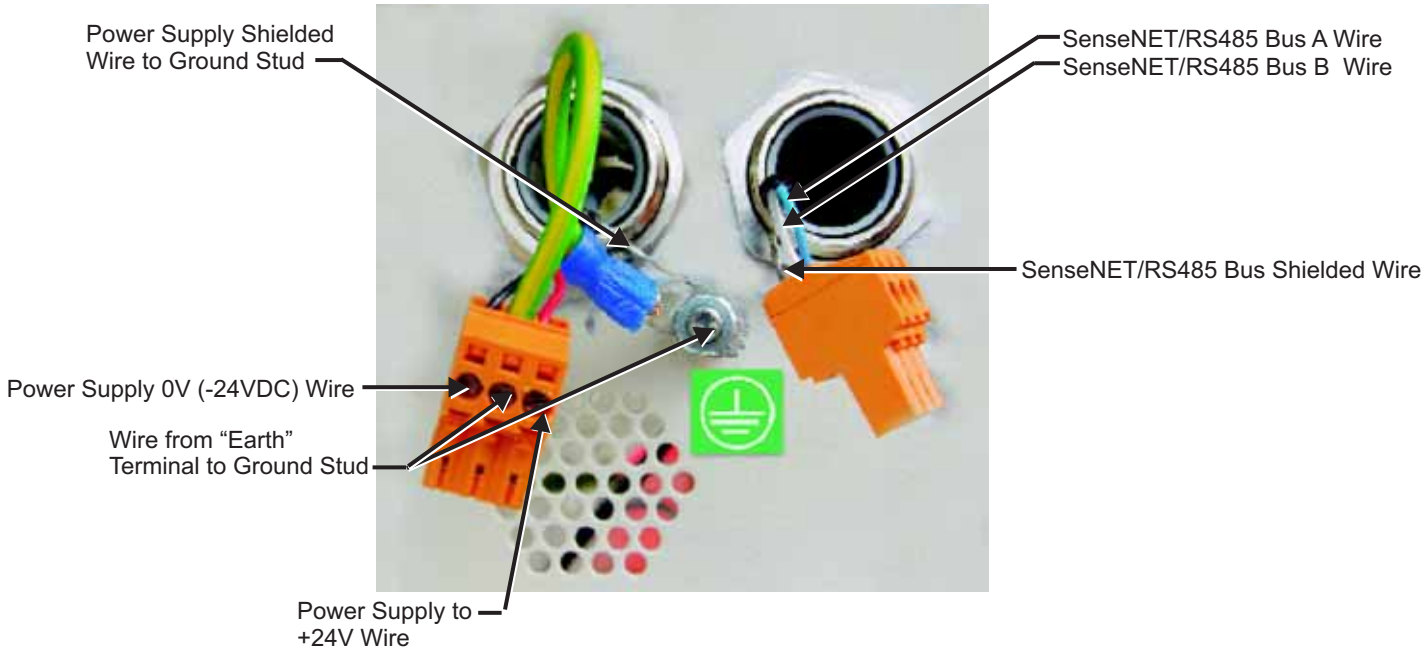

Figure 2-6. Power and Signal Connections to the Docking Station

2-11 RELAY BOARD

The ASD-320 is fitted with two relays, FIRE 1 and FAULT. An add-on board is available which repeats the basic FIRE 1 and FAULT, but also adds PRE-Alarm, AUX ALARM, and FIRE 2 relays. This board also provides inputs which can be used to reset and desensitize the detector.

2-12 INTERFACING WITH FIRE ALARM PANELS

Because of the flexible nature of the ASD-320 Detector and the many possible configurations, there are many options for interfacing the Detectors to the Fire Panel. The ASD-320 Detector provides the following methods of interfacing with fire alarm panels:

- To conventional fire alarm panels using the Detector's FIRE 1 and FAULT relay contacts
- To addressable fire alarm panels via Addressable Programmable Interface Cards (APICs)

APICs, which can be mounted inside the ASD-320 Detector, may simplify installation when connecting to addressable signaling line circuits (SLC). The APIC used is completely dependent on the SLC protocol, and therefore, the make and model of the fire alarm panel.

WARNING **Incompatible APIC panel combinations may result in a non-operational system which may fail to perform during an event, with resultant loss of life and/or property.**

APICs plug into a connector on the main PCB via a ribbon cable. Once plugged in, the SLC in and out are connected to the main PCB addressable bus terminals and the address DIP switches are set to the SLC address. APICs have two modes of operation: single address and multi-address.

When the interface is set to single address mode, the card appears at a single address on the SLC and the Detector status is read from that address.

Multi-address mode is used when monitoring the status of multiple Detectors with consecutive addresses from a single SLC. Multi-address mode is normally only used in the Command Mode.

2-13 SETTING THE DETECTOR ADDRESS

In order to identify itself to the PC Command Module or fire panel, each Detector needs to have a unique address ranging from 1 to 127. The Detector address is set on the DIP switch SW1 at the bottom left of the opened Detector on the main circuit board. The switch settings are up for 1 and down for 0, and the Detector address is set as a 7-bit binary code (switch 8 equates to a value of 128 and so is outside the usable address range). Refer to Figure 1-2 for the location of ASD-320 DIP switches.

Figure 2-7 shows a sample DIP switch setting.

The address equates to 01100011 in binary, or:

(1 x 1) + (1 x 2) + (0 x 4) + (0 x 8) + (0x 16) + (1 x 32) + (1 x 64) + (0 x 128) = 99

The full range of available addresses and their relevant switch settings are provided in Table 2-2 for reference.

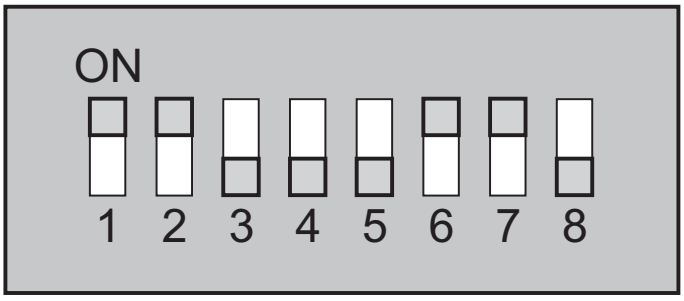

Figure 2-7. Sample DIP Switch Settings

2-13.1 Address Table

Addresses chosen for Detectors do not have to be consecutive or in a given order so long as they are all different. Table 2-2 provides the address table for Detectors.

Table 2-2. Address Table

Address	1	2	3	4	5	6	7	8
1	1	0	0	0	0	0	0	0
2	0	1	0	0	0	0	0	0
3	1	1	0	0	0	0	0	0
4	0	0	1	0	0	0	0	0
5	1	0	1	0	0	0	0	0
6	0	1	1	0	0	0	0	0
7	1	1	1	0	0	0	0	0
8	0	0	0	1	0	0	0	0
9	1	0	0	1	0	0	0	0
10	0	1	0	1	0	0	0	0
11	1	1	0	1	0	0	0	0
12	0	0	1	1	0	0	0	0
13	1	0	1	1	0	0	0	0
14	0	1	1	1	0	0	0	0
15	1	1	1	1	0	0	0	0
16	0	0	0	0	1	0	0	0
17	1	0	0	0	1	0	0	0
18	0	1	0	0	1	0	0	0
19	1	1	0	0	1	0	0	0
20	0	0	1	0	1	0	0	0
21	1	0	1	0	1	0	0	0
22	0	1	1	0	1	0	0	0
23	1	1	1	0	1	0	0	0
24	0	0	0	1	1	0	0	0
25	1	0	0	1	1	0	0	0
26	0	1	0	1	1	0	0	0
27	1	1	0	1	1	0	0	0
28	0	0	1	1	1	0	0	0
29	1	0	1	1	1	0	0	0
30	0	1	1	1	1	0	0	0
31	1	1	1	1	1	0	0	0
32	0	0	0	0	0	1	0	0
33	1	0	0	0	0	1	0	0
34	0	1	0	0	0	1	0	0
35	1	1	0	0	0	1	0	0
36	0	0	1	0	0	1	0	0
37	1	0	1	0	0	1	0	0
38	0	1	1	0	0	1	0	0
39	1	1	1	0	0	1	0	0
40	0	0	0	1	0	1	0	0
41	1	0	0	1	0	1	0	0
42	0	1	0	1	0	1	0	0
43	1	1	0	1	0	1	0	0
44	0	0	1	1	0	1	0	0

Table 2-2. Address Table

Address	1	2	3	4	5	6	7	8
45	1	0	1	1	0	1	0	0
46	0	1	1	1	0	1	0	0
47	1	1	1	1	0	1	0	0
48	0	0	0	0	1	1	0	0
49	1	0	0	0	1	1	0	0
50	0	1	0	0	1	1	0	0
51	1	1	0	0	1	1	0	0
52	0	0	1	0	1	1	0	0
53	1	0	1	0	1	1	0	0
54	0	1	1	0	1	1	0	0
55	1	1	1	0	1	1	0	0
56	0	0	0	1	1	1	0	0
57	1	0	0	1	1	1	0	0
58	0	1	0	1	1	1	0	0
59	1	1	0	1	1	1	0	0
60	0	0	1	1	1	1	0	0
61	1	0	1	1	1	1	0	0
62	0	1	1	1	1	1	0	0
63	1	1	1	1	1	1	0	0
64	0	0	0	0	0	0	1	0
65	1	0	0	0	0	0	1	0
66	0	1	0	0	0	0	1	0
67	1	1	0	0	0	0	1	0
68	0	0	1	0	0	0	1	0
69	1	0	1	0	0	0	1	0
70	0	1	1	0	0	0	1	0
71	1	1	1	0	0	0	1	0
72	0	0	0	1	0	0	1	0
73	1	0	0	1	0	0	1	0
74	0	1	0	1	0	0	1	0
75	1	1	0	1	0	0	1	0
76	0	0	1	1	0	0	1	0
77	1	0	1	1	0	0	1	0
78	0	1	1	1	0	0	1	0
79	1	1	1	1	0	0	1	0
80	0	0	0	0	1	0	1	0
81	1	0	0	0	1	0	1	0
82	0	1	0	0	1	0	1	0
83	1	1	0	0	1	0	1	0
84	0	0	1	0	1	0	1	0
85	1	0	1	0	1	0	1	0
86	0	1	1	0	1	0	1	0
87	1	1	1	0	1	0	1	0
88	0	0	0	1	1	0	1	0
89	1	0	0	1	1	0	1	0

Table 2-2. Address Table

Address	1	2	3	4	5	6	7	8
90	0	1	0	1	1	0	1	0
91	1	1	0	1	1	0	1	0
92	0	0	1	1	1	0	1	0
93	1	0	1	1	1	0	1	0
94	0	1	1	1	1	0	1	0
95	1	1	1	1	1	0	1	0
96	0	0	0	0	0	1	1	0
97	1	0	0	0	0	1	1	0
98	0	1	0	0	0	1	1	0
99	1	1	0	0	0	1	1	0
100	0	0	1	0	0	1	1	0
101	1	0	1	0	0	1	1	0
102	0	1	1	0	0	1	1	0
103	1	1	1	0	0	1	1	0
104	0	0	0	1	0	1	1	0
105	1	0	0	1	0	1	1	0
106	0	1	0	1	0	1	1	0
107	1	1	0	1	0	1	1	0
108	0	0	1	1	0	1	1	0
109	1	0	1	1	0	1	1	0
110	0	1	1	1	0	1	1	0
111	1	1	1	1	0	1	1	0
112	0	0	0	0	1	1	1	0
113	1	0	0	0	1	1	1	0
114	0	1	0	0	1	1	1	0
115	1	1	0	0	1	1	1	0
116	0	0	1	0	1	1	1	0
117	1	0	1	0	1	1	1	0
118	0	1	1	0	1	1	1	0
119	1	1	1	0	1	1	1	0
120	0	0	0	1	1	1	1	0
121	1	0	0	1	1	1	1	0
122	0	1	0	1	1	1	1	0
123	1	1	0	1	1	1	1	0
124	0	0	1	1	1	1	1	0
125	1	0	1	1	1	1	1	0
126	0	1	1	1	1	1	1	0
127	1	1	1	1	1	1	1	0

2-14 CONNECTING AN ASD-320 TO A SENSENET/RS485 DETECTOR NETWORK

Up to 127 Detectors may be linked in a single SenseNET bus, supporting a total length of wire between adjacent Detectors of up to 3/4 mile (1.2 km).

Figure 2-8 shows an example of two AIR-Intelligence Detectors linked into a 127-Detector bus with a Command Module and a number of ASD-640 Detectors. It will be noted that whereas the ASD-640 Detectors have two input/output buses (1A/1B and 2A/2B), the ASD-320 Detector has only a single such bus (A/B). Therefore, each bus terminal has an input and an output wire, compared with a single wire in each terminal in the ASD-640.

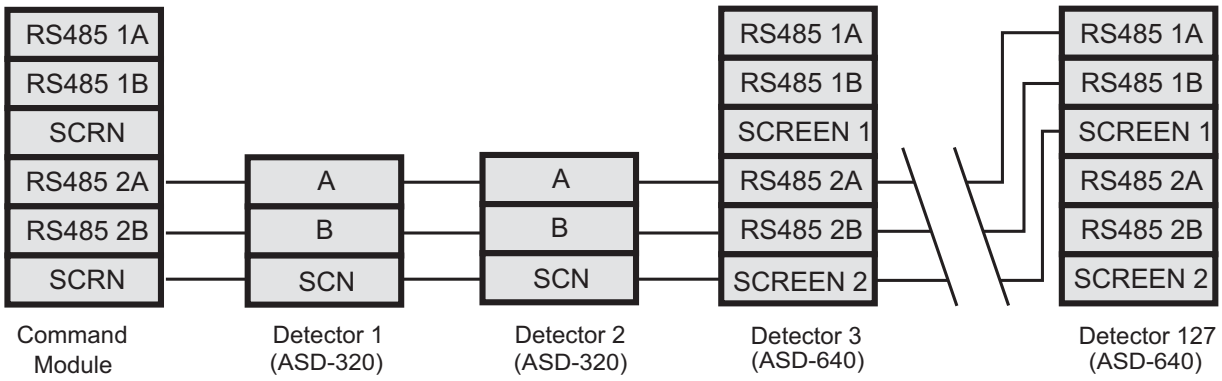

Figure 2-8. Connecting an ASD-320 Detector to a SenseNET Network

It is easy to join the input and output wires for each bus and screen connection together and to solder or crimp a single wire or connecting ferrule to each wire pair so that they are easier to fit into the screw terminals. If this is performed, it is recommended that bare wire joints be insulated to prevent possible shorting of the data bus, which will cause a drop-out of data on the SenseNET bus.

In the example shown in Figure 2-8, there could be a total length of RS485 cable of up to 3/4 mile (1.2 km) between the Command Module and Detector 3, since these are all on a single bus. However, Detector 3 is an ASD-640 which has a second communications bus (RS485 bus 2) and an RS485 repeater. This allows a further total of 3/4 mile (1.2 km) of cable until the next ASD-640 in the RS485 loop.

In the example shown in Figure 2-8, if Detectors 4-126 (not shown) are all of the ASD-320 type, then the total length of wiring between Detectors 3 and 127 would be limited to 3/4 mile. However, each additional ASD-640 Detector wired up using both RS485 buses would allow an additional 3/4 mile of cabling to be added to the RS485 loop.

2-15 CONNECTING AN ASD-320 TO AN ADDRESSABLE FIRE PANEL

An Addressable Protocol Interface Card (APIC) may be used to decode Detector information and to relay this to a Fire Panel. The APIC is fitted to the four mounting studs on the ASD-320 PCB using the supplied screws as shown in Figure 2-9.

The connections to the Fire Panel are made using the BUS L1 and H1 (bus 1 Low and High) and the BUS L2 and H2 (bus 1 Low and High) terminal connectors shown in Figure 2-5.

The only settings that need to be made are on the APIC address DIP switches. The start loop address is entered on SW1 and the end loop address on SW2. In the case of a single ASD-320, the start and end addresses will be the same.

Note: The Detector address on the SenseNET loop and the Fire Panel addressable protocol address are the same (which means that no address translation is performed). Some protocols may not support all the available alarm levels and fault reporting is usually a general fault with no detailed fault information. Consult the specific APIC protocol documentation for more information.

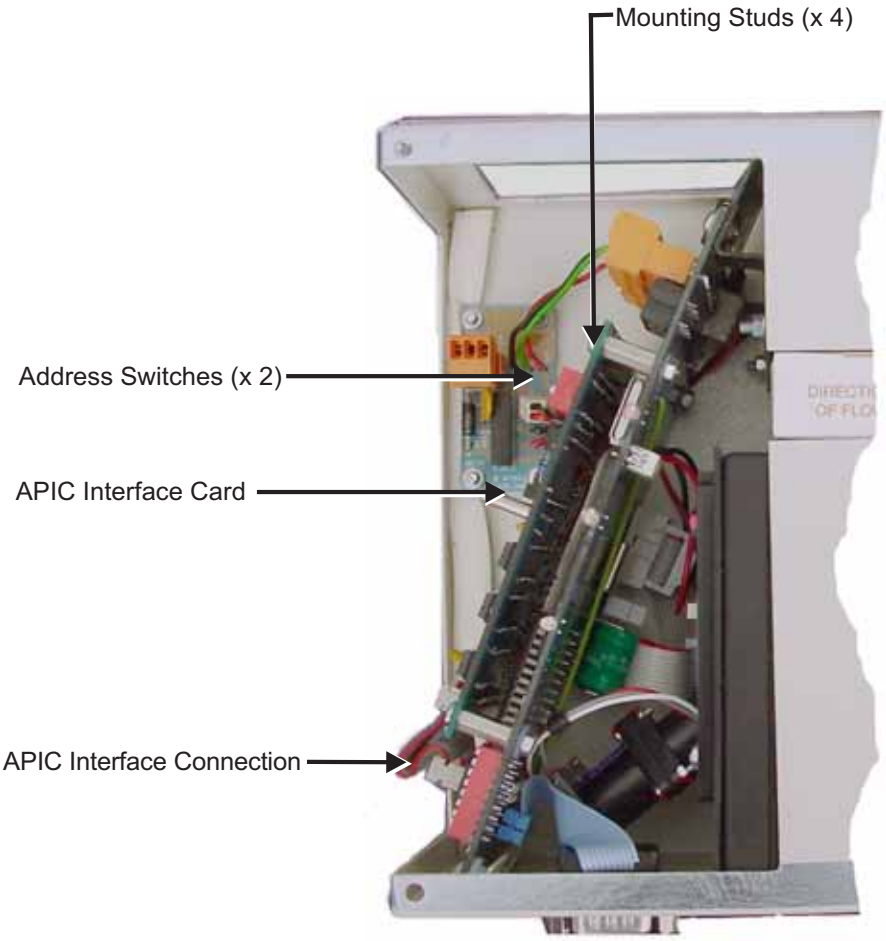

Figure 2-9. Connecting an ASD-320 to an Addressable Fire Panel

2-16 FINAL INSTALLATION

Once the power and signal connections are made, slide the Detector body up into the docking station and fasten it into position using the M4 pan head screws provided. Slot the power and signal terminal blocks into the relevant sockets on the Detector PCB (which will only click fully home in the correct orientation). Lastly, replace the Detector cover using the six pan head screws provided. Refer to Figure 2-10.

Note: The Detector is designed solely for operation with the front cover securely fitted using all six fixing screws.

2-17 REMOVING THE DETECTOR

Removing the Detector is the reverse of the installation process, leaving the pipework and wiring connections installed in the docking station (as shown in Figure 2-6).

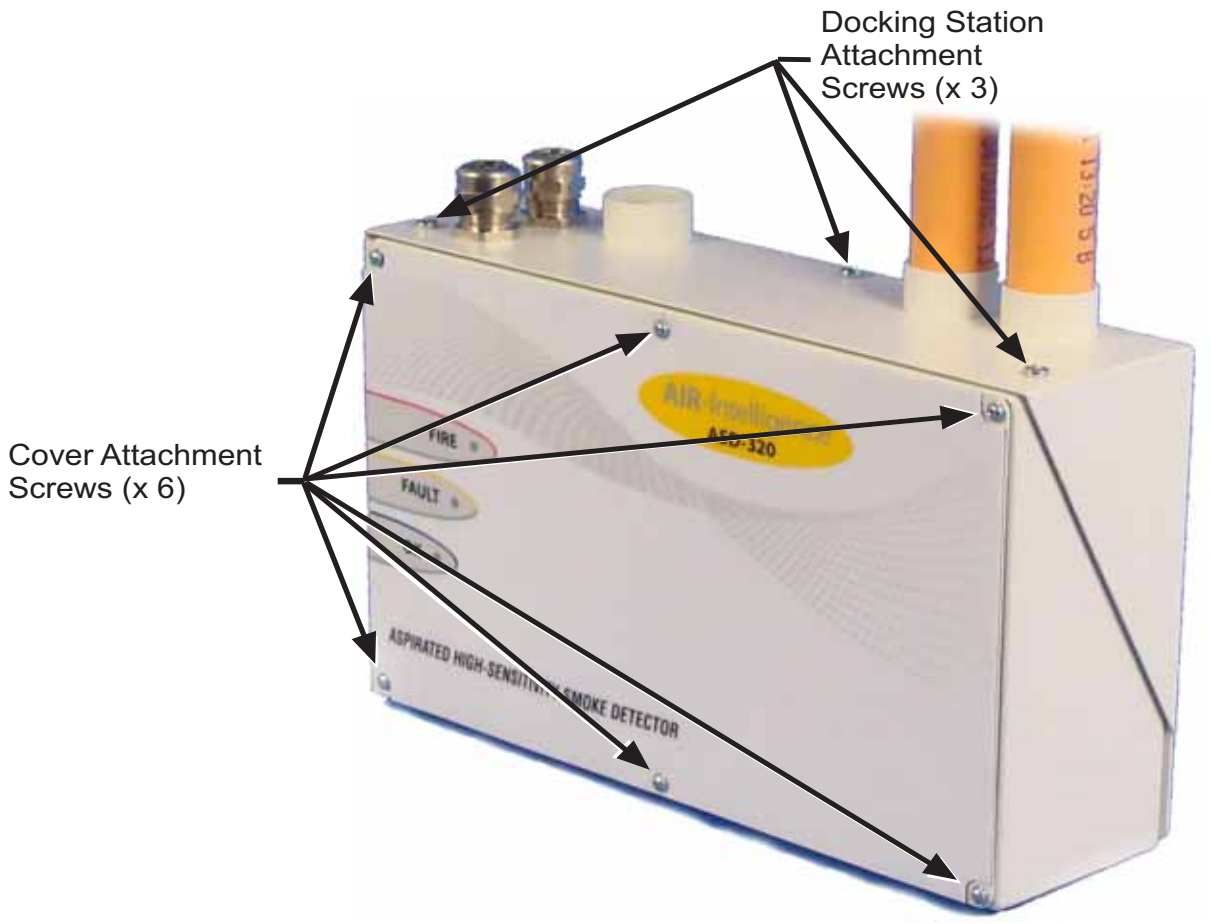

Figure 2-10. Final Installation of the ASD-320

2-18 CONFIGURING THE ASD-320 DETECTOR AFTER INSTALLATION

ASD-320 programmable functions are accessed using a PC (connected to the Detector) running either the Remote Configuration or SenseNET programs:

1. **Remote Configuration** - Provided free of charge with every AIR-Intelligence Detector, this software package enables the user to set up and configure the programmable functions of one or more Detectors or Command Module from a computer connected via an RS232 serial cable. Complete instructions on how to install, launch and use the Remote Configuration Software are provided in the *Remote Software Configuration User's Guide* under separate cover.
2. **SenseNET**-This software is available for purchase from AIR-Intelligence. SenseNET software can configure and manage a large network of Detectors with a simple, streamlined graphical user interface from a computer connected to a Detector or Command Module via an RS232 serial cable or RS485 converter interface. Complete instructions on how to install, launch and use the SenseNET software are provided in the *SenseNET Software User's Guide* under separate cover.

Note: Since the ASD-320 does not include a front panel display or keypad, programmable functions cannot be accessed via the unit itself.

Refer to Section 2-19 of this manual for instructions on how to connect a PC to a ASD-320 Detector.

2-18.1 List of Programmable Functions

In both the Remote Configuration and SenseNET software programs, the tabbed **Functions settings** window contains all of the available programmable functions.

For details about these functions, refer to the appropriate manuals provided separately:

- *Remote Configuration Software User's Guide*
- *SenseNET Software User's Guide*

To change one of the programmable functions, go to the relevant tab, make the change, and then select <**OK**> to save the changes to the Detector's internal firmware.

The following programmable functions are available:

- Time and Date
- Alarm Levels
- Alarm Delays
- ClassiFire Override (when optional Input/Relay card is installed)
- Alarm Factor
- LDD™ Enable
- FastLearn™ Enable
- Auto FastLearn Enable
- ClassiFire 3D
- Demo Mode
- Day Start/Night Start
- Disable Day/Night Switching
- Remote Functions (when optional Input/Relay card is installed)
- Programmed Isolate
- Latching Alarms
- Latching Faults
- Cascading Alarms
- Device Type
- Firmware Version
- Run-time Hours
- Watchdog Count
- Device Text
- Reference Detector
- Reference Enable
- Reference Level
- Reference Back-off
- Flow Rate
- Flow High Limit
- Flow Low Limit

- Access Code
- Chart Recording Rate
- Separator Condition
- Separator Change Date
- Factory Default
- Reset
- Real Time ClassiFire Viewer Histograms
- Chart Recording

2-19 CONNECTING TO A PC

To connect a single stand-alone Detector to a PC, connect the PC‘s serial port directly to the Detector‘s 9-way RS232 port. Connections for this cable are shown in Figure 2-11.

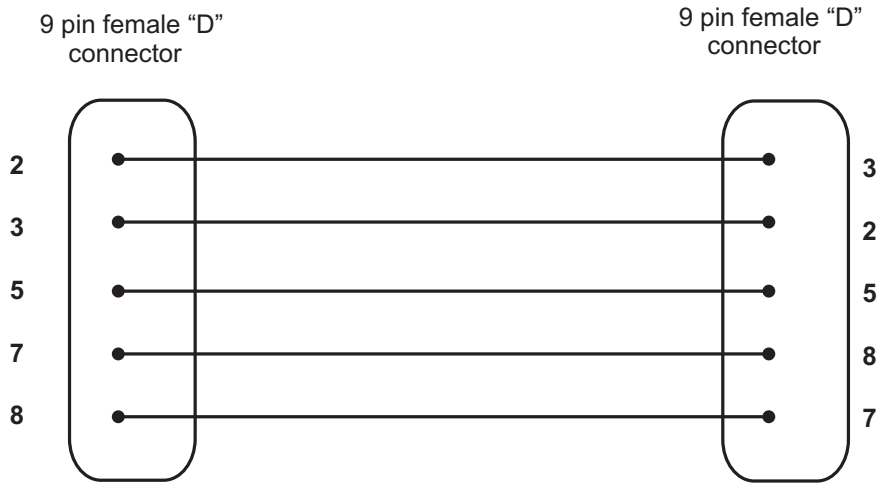

Figure 2-11. RS232 Cable Connections

Figure 2-12 shows the RS232 cable connection from an ASD-320 Detector to a PC

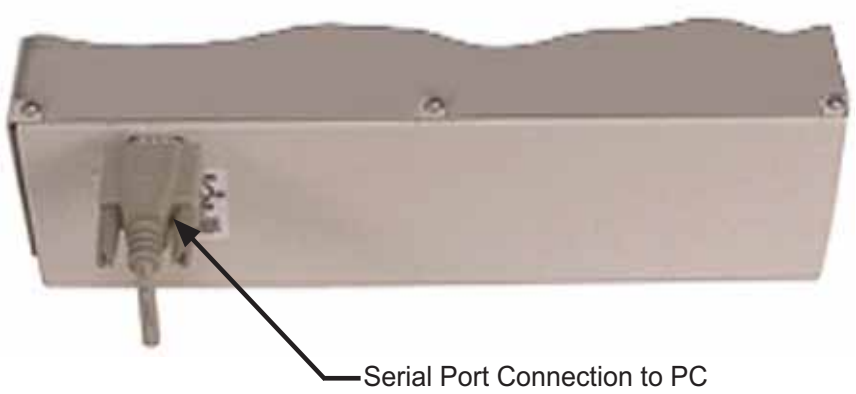

Figure 2-12. ASD-320 Serial Port Connection for a PC

2-20 EVENT LOG

The **Event Log** is a record of Detector events such as faults, alarms and function changes. It is stored inside an operating Detector and is updated whenever an event occurs. The event log is non-volatile, which means that it is retained when the Detector is turned off. The last 200 Detector events may be stored.

An event is defined as:

- A change to any programmed function
- A detector output level meeting or exceeding the Pre-Alarm, Aux, Fire 1, or Fire 2 alarm thresholds
- A fault condition such as a flow or dust separator (filter) fault
- A start of day or night operation
- Demonstration Mode start
- FastLearn start or stop
- Power on or off

Events can either be viewed on a PC screen or downloaded to disk by running the Remote Configuration program.

When the detector event log is full (200 events have been logged) and a new event occurs, the oldest event in the log is deleted (First-In, First-Out).

To download the event log, connect a PC to the detector serial port and run the Remote Configuration or SenseNET programs. Consult either:

- *Remote Configuration Software User's Guide;* or
- *SenseNET Software User's Guide*

for more information.

CHAPTER 3
COMMISSIONING

3-1 INTRODUCTION

This chapter covers the commissioning procedures for the AIR-Intelligence™ ASD-320. Commissioning strategy initially depends upon the environment in which the Detector is installed. For instance, the test for a computer room (in a relatively clean environment) would be very different from, say, a flour mill, with a high level of airborne particulate content.

Commissioning should only be done by factory-trained technicians in accordance with applicable standards. These include:

(1) NFPA-70 (National Fire Protection Association)

(2) NFPA-72

(3) Any other applicable installation requirements or standards

3-2 COMMISSIONING CHECKLIST

The following brief checklist allows quick setup of the Detector. This procedure will be adequate for most standard installations.

1. Before powering up the Detector, visually check all cabling to ensure correct connection. If wire identification is not immediately clear (e.g. by use of different colored wires or wire identification sleeves), an electrical check should be made.

CAUTION **Ensure all wiring connections are checked prior to powering up the Detector. Incorrect wiring of the Detector will cause permanent damage to the Detector.**

2. Connect the Detector to a PC and set the Detector address on the DIP Switches and APIC board (if applicable). Refer to Sections 2-14 and 2-16 for more information.
3. Power up the Detector.
4. Ensure all Detectors in the network area are clear of Troubles and Alarms (if applicable).
5. Launch either the Remote Configuration Software or SenseNET™ on the computer, enter the access code, and select the **Function Settings** window.
6. Verify that the time and date are correct in the **Time and date** tab.
7. Set an appropriate alarm factor for the protected environment in the **Alarm levels and delays** tab. The Detector will automatically perform FastLearn™ for the new alarm factor (takes approximately 15 minutes). The OK indicator on the front panel will begin to flash. If using **Day / Night** switching, check that the **Day Start** and **Night Start** times reflect site operations.
8. While the Detector is still in FastLearn mode, place a checkmark next to the **Demo mode** command at the bottom of the **Alarm levels and delays** screen. The Detector will enter **Demo mode** (where it estimates its final sensitivity) immediately after the FastLearn cycle has finished.

Note: Checking the **Demo mode** box only puts the Detector into **Demo mode** while the Detector is performing a FastLearn. It has no effect at any other time.

9. Verify that the FastLearn has concluded (the OK indicator has stopped flashing). With the Detector in **demo mode**, perform any necessary smoke tests, ensuring that the Detector reacts appropriately, and let the smoke fully dissipate.
10. Perform another FastLearn, this time NOT putting the Detector into **demo mode**. Do this by placing a checkmark next to the **FastLearn Enable** command in the **Alarm levels and delays** screen. The OK indicator on the front panel will begin to flash.
11. The Detector will generate no alarms during the 15 minute FastLearn period and, after this, the Detector will operate at a reduced sensitivity for 24 hours while ClassiFire® acclimates to the protected environment and sets up appropriate day and night sensitivity settings.
12. If desired, exit the Remote Configuration or SenseNET software, power down the PC and remove it from the Detector serial port.

3-3 PRE-COMMISSIONING PREPARATION

Commissioning should be performed after all construction has been completed and cleaned of any lingering post-construction dirt. If ambient monitoring conditions are recorded before the installation is cleaned up, they may not accurately reflect actual normal operating conditions that need to be used as reference data for follow-up maintenance procedures and tests.

3-4 ACCLIMATION PERIOD

The Detector will operate at a reduced sensitivity for 24 hours. ClassiFire will set up the appropriate day and night sensitivity settings. All air handling units, thermostats, and other systems that can have an effect on the operating environment should be turned on to simulate normal operating conditions as closely as possible. After one week of monitoring time, download the Detector event log to a PC from the RS232 port using a serial cable. Review the event log for any unexpected messages. Investigate and correct any condition that cannot be accounted for.

3-5 SUCTION PRESSURE VERIFICATION

All sample hole suction pressures should be measured and recorded on the checklist. Measured suction pressures less than 0.5 inches of water are not acceptable.

Use the following method to measure sampling point suction pressures (as illustrated in Figure 3-1):

1. Attach a flexible hose onto the suction side of the magnehelic pressure gauge.
2. Place the hose against the sampling hole and hold in place.
3. Hold the gauge in the plane in which it was calibrated and read the suction pressure from the gauge.

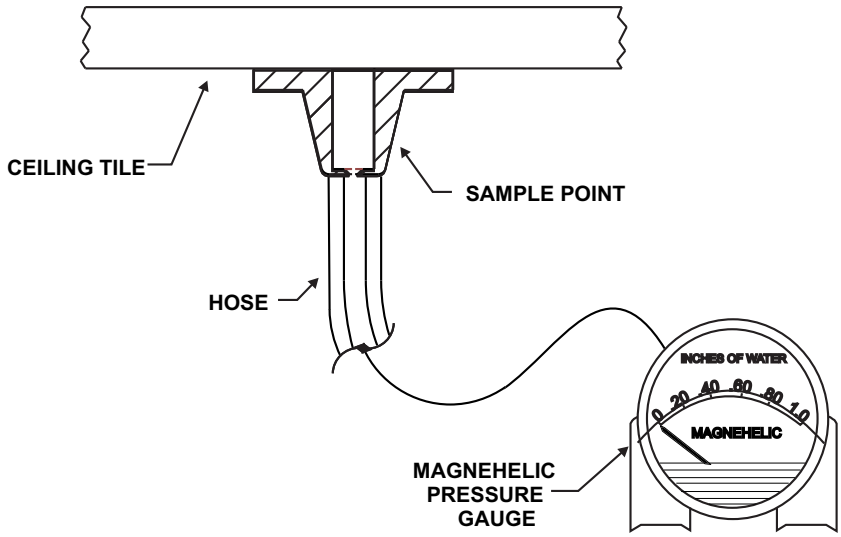

Figure 3-1. Magnehelic Test Setup

3-6 TRANSPORT TIME VERIFICATION

Maximum transport time verification test is the measure of the amount of time it takes for the Detector to respond to smoke that enters the pipe at the sampling point furthest from the Detector. The results of this test and the calculated maximum transport time from PipeCAD™ must be recorded on the checklist. Measured transport time less than the calculated time is acceptable.

Follow these steps to measure the maximum transport time of the system:

1. Determine the furthest sampling point from the Detector.
2. Allow test smoke to enter pipe at the furthest sampling point.
3. Record the amount of time for the Detector to respond. This is the actual maximum transport time.

3-7 GROSS SMOKE TESTING

The gross smoke test is a measurement of the amount of time elapsing from the activation of the smoke generating medium, until **Pre-Alarm** and **FIRE 1** is reached. This test should be repeated at least three times with consistent results. Recommended smoke generating medium is aerosol-simulated smoke or wire burner.

3-7.1 Aerosol Smoke Spray

There are a number of commercially available aerosol smoke sprays or “canned smoke.” Please refer to your supplier for a recommended product. When using canned smoke, introduce only enough smoke into the protected area that will cause an **FIRE 1** condition. This may require a number of practice sprays. Follow the manufacturer’s instructions.

CAUTION

Oil-based canisters that are used to test point detectors are not suitable for testing aspirating systems, as the particulate is heavy and tends to drop out in the pipe, never actually reaching the Detector. Also, the oily residue that is left behind may affect the functionality of the Detector.

3-7.2 Wire Burner Test

The wire burner test is considered the most representative test of incipient fire hazard detection in telecommunications or computer room environments. The test is performed by applying a voltage to a piece of PVC-insulated cable. Smoke is produced from the overheated PVC insulation by evaporation and condensation of the plasticizer. As the wire becomes hotter, hydrogen chloride (HCl) gas is emitted from the insulation. The by-products of overheated PVC insulation can be detected by the ASD-320.

3-7.2.1 WIRE BURNER TEST 1 (OPTIONAL)

The following test is considered unlikely to produce hydrochloric acid vapor. This test may be undertaken in underfloor spaces or ceiling voids.

1. Connect a 6.5-foot (2-meter) length of wire to a 6 VAC source of at least 16 Amps rating per wire for a period of **3 minutes**.
2. The system should respond within 120 seconds of cessation of energization. After this period, very little smoke is given off.

Note: The wire is subject to cooling if positioned in direct contact with air flows and may need to be shielded.

Note: The wire cross-section should be American Wire Gauge (AWG) 10 with the following diameter and area:

Diameter = 2.59 mm or 0.10189 in.

Cross-Section Area = 5.0 mm^2 or 0.00775 $in.^2$

3-7.2.2 WIRE BURNER TEST 2 (OPTIONAL)

WARNING **The following test is considered to produce sufficiently high temperature to generate small quantities of hydrogen chloride or hydrochloric acid gas. Be sure to keep a safe distance away while voltage is being applied.**

This test may be undertaken in underfloor spaces or ceiling voids where rapid airflow may render Test 1 unsuitable.

1. Connect a 3.25-foot (1-meter) length of wire to a 6 VAC source of at least 16 Amps rating per wire for a period of **1 minute**.
2. The system should respond within 120 seconds of cessation of energization. After this period, most of the insulation should be burned off.

Note: The wire cross-section should be American Wire Gauge (AWG) 10 with the following diameter and area:

Diameter = 2.59 mm or 0.10189 in.

Cross-Section Area = 5.0 mm^2 or 0.00775 in^2.

CAUTION **A wire burner/canned smoke test could activate spot-type detectors.**

CHAPTER 4
TROUBLESHOOTING

4-1 TROUBLESHOOTING THE AIR-INTELLIGENCE ASD-320

This chapter provides some possible solutions if a problem should occur with your AIR-Intelligence™ ASD-320. If the problem is not addressed in this chapter or, if after performing the suggested actions, the problem persists, contact Technical Support at (866) 287-2531.

Note: Consult either the *Remote Configuration Software User's Guide* or *SenseNET™ Software User's Guide* for more information about the Solutions/Corrective Actions discussed here.

Table 4-1. Troubleshooting Guide

Problem	Solution / Corrective Action
Nuisance Alarms Occur Too Often	• Check that the ClassiFire® alarm factor setting is appropriate for the normal working environment of the protected area. • Check that the detector is not in Demo mode. This can be ascertained by viewing the event log and checking that the entry **Demo mode** has a higher log entry number than the most recent **FastLearn™ start** and **FastLearn end** entries. **NOTE: Remember that the log entries are in reverse order, with the most recent entries appearing first.** If the log shows that Demo mode was invoked during the last FastLearn period, start a new FastLearn and allow it to complete its 24-hour cycle. • From the event log, check that 24 hours have elapsed since the last **FastLearn end** entry. • Check that day-night switchover times are appropriately set to reflect active and non-active periods.
Elevated Smoke Levels Do Not Generate Alarms	• Check that detector is not Isolated or in FastLearn (if Isolated, the **Fault** light will be lit; if in FastLearn, the **OK** light will flash). • Check that the detector sampling points are in the smoke stream. • Check that sampling pipes are firmly and cleanly seated in their ports and undamaged. • Check that the correct ClassiFire alarm setting has been set. • Check that the detector has either had a 24-hour learning period or that it has been placed in **Demo Mode**.
Low Mean Output	Check that the dust separator (filter) cartridge does not require changing (refer to Section 5-3.8 in Chapter 5 for details) and that the air plenum chamber is clean. The chamber may become clogged when, for example, heavy building activity has occurred near the sampling pipes. If so, the chamber may require factory service. The detector is not designed to handle large quantities of coarse debris and dust.
Detector Sensitivity Varies Over Time	There are many reasons why particle densities may vary, and the ClassiFire system is designed to automatically compensate for this in order to reduce the likelihood of nuisance alarms due to normal variations in background smoke density. Within limits set by the ClassiFire alarm factor, this is a normal part of the detector's operation.

Table 4-1. Troubleshooting Guide (Continued)

Problem	Solution / Corrective Action
Flow Fault Errors	• These occur when the airflow rate into the detector exceeds the pre-programmed parameters. As the detector 'learns' the flow setup from the initial installation, this usually means that there has been some change in conditions. A **Flow high** fault may indicate that a sampling pipe is damaged, and a **Flow low** fault may indicate that the pipe has been blocked, e.g., by nearby building operations. • If the detector input is sampled from one area and the exhaust is in another area with different pressure (e.g., the detector is in a roof space and sampling from an enclosed room), this may lead to flow faults. In this case it, would be necessary to lead a pipe from the exhaust to the protected area to ensure nominal flow.
"Low Flow" Error Message	• Check that the pipe is not blocked. • If the pipe is unused, check that the flow sensor for this pipe has been disabled. • Check that the low flow fault threshold is not set too high.
"High Flow" Error Message	• Check that the pipe is seated in the inlet and is not broken or cracked. • Check that installed pipework is fitted with endcaps. AIR-Intelligence™'s PipeCAD™ pipe modeling software prompts for the use of appropriate endcaps. Open bore pipes are not recommended. • Check that the high flow fault threshold is not set too low.

CHAPTER 5
MAINTENANCE

5-1 INTRODUCTION

This chapter contains maintenance instructions for the AIR-Intelligence™ ASD-320 system. These procedures should be performed on a scheduled basis. In the event that system problems are found during routine maintenance, refer to Chapter 4 of this manual, "Troubleshooting."

5-2 SCHEDULED MAINTENANCE

The scheduled maintenance of the system should be performed at an established interval. At a minimum, the interval between performance of maintenance procedures should not exceed any applicable regulations or standards. (See NFPA-72 or other local requirements.) This chapter contains minimum maintenance procedures, however, additional and/or more frequent procedures may be required by applicable codes and standards.

5-3 MAINTENANCE PROCEDURES

The following paragraphs outline general scheduled maintenance procedures.

5-3.1 Visual Check

The visual check must be performed at least every six months. This check is to insure pipe network integrity.

To perform the visual check, observe the entire piping network and check for abnormalities in the pipes including any breaks, blockages, crimps, etc.

5-3.2 Battery Status Check

The battery backup used in the power supply to power the Detector must be tested at least every six months.

A battery status check is best accomplished by running the load with the batteries for about one hour. While the load is still on, measure the individual battery voltages. If any battery reads 1.5 volts or more below its rated voltage, that battery should be replaced.

Generally, if one of a series set of batteries is low, the others will soon fail. Therefore, it is advisable to replace all the batteries of a series set when one requires replacement.

CAUTION **Any battery that has been in service for 48 months or more must be replaced.**

5-3.3 Gross Smoke Test

The gross smoke test is a Go/No-Go test which ensures that the Detector responds to smoke. This test must be performed at system commissioning and at least every year thereafter.

To perform this test, smoke must be introduced into the last sampling hole in each branch of the pipe network and the proper response must be verified by the Detector. Smoke from a punk or cotton wick may be used. Aerosol test smoke may also be used.

Note: For cleanroom applications, consult with supplier for gross smoke test methods.

5-3.4 Suction Pressure Verification Test

The sampling hole airflow verification test ensures the pipe network is drawing air from the protected area. This test must be done at commissioning and within one year after installation and at least every year thereafter.

To perform this test, the suction pressure of the last sampling hole in each pipe branch must be checked. (Refer to Section 3-5 in Chapter 3 of this manual for test details.) Suction pressures should be compared to the original measurements. If any differences are noted, the cause of the deviation must be determined.

5-3.5 Transport Time Verification Test

The maximum transport time of the pipe network must be measured and compared to the recorded transport time at commissioning. (Refer to Section 3-6 in Chapter 3 of this manual for test details.) The transport time verification test must be done at commissioning and at least every year thereafter.

5-3.6 Detector Sensitivity Test

The Detector sensitivity test must be performed within one year of installation and at least every alternate year thereafter.

Example:

- Year-one check
- Year-three check
- If years one and three are OK, go to five-year interval.

The Detector employs a self-monitoring, automatically adjusting calibration for the system. The inspection only requires a periodic visual inspection for a Detector fault indication and performing the Detector sensitivity test function.

If the self-monitoring feature of the system senses that the operation of the Detector head is outside its normal range, a trouble condition will be generated.

5-3.7 Cleaning the Detector

The exterior of the Detector should be cleaned as necessary. Clean the Detector with a damp (not wet) cloth.

CAUTION **Do not use solvents to clean the Detector. Use of solvents may cause damage to the Detector.**

5-3.8 Replacing the Dust Separator (Filter) Cartridge

The only part that may require field replacement during servicing is the dust separator (filter) cartridge. Its condition can be checked using the **Dust Separator** test in the **Diagnostics** menu of the Remote Configuration or SenseNET software, which gives a percentage reading of dust separator (filter) efficiency. When this level drops to 80%, the Detector will signal a **Separator renew** fault indicating that the dust separator (filter) cartridge needs to be replaced.

Consult either:

- the *Remote Configuration Software User's Guide; or*
- *SenseNET™ Software User's Guide*

for more information.

WARNING **If, due to the environment of the area being protected, the dust in the dust separator (filter) will expose maintenance personnel to health hazards, it is recommended that suitable masks and protective clothing be worn when changing filters. Maintenance work should be performed in compliance with OSHA if applicable.**

Note: Used dust separator (filter) cartridges are not intended for re-use and should be discarded.

To replace the cartridge:

1. Remove the six attachment screws which fasten the unit's front cover.
2. With the front cover removed, grasp the filter firmly and pull the filter out (directly towards you).
3. Properly dispose of the used cartridge.
4. Insert the replacement filter cartridge such that the orientation of the "Direction of flow" arrow printed on the cartridge corresponds to the arrow on the "Direction of flow" label beside the filter slot.
5. Slide the cartridge all the way into place.
6. Replace the cover, and secure with all six fastening screws, and initiate a new FastLearn™ routine.

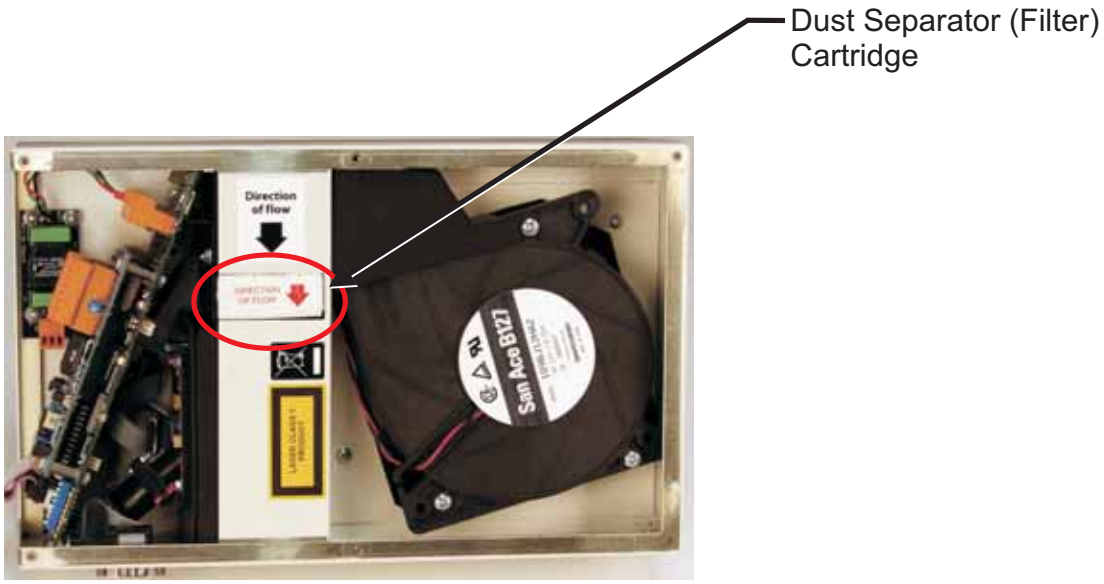

Figure 5-1. Location of Dust Separator (Filter) Cartridge

5-4 DIAGNOSTICS

Both the Remote Configuration and SenseNET software packages include a diagnostic function which carries out a number of checks to verify the correct functioning of up to 127 Detectors on a loop. These tests should be performed as part of a routine maintenance program.

A status bar will provide details about the tests being carried out. When the diagnostics are complete, the Status indicator for the selected Detector in the main **Diagnostics** window of the software will either change from “Untested” to “OK” (if no problems are found) or will detail any fault found.

Consult either:

- *Remote Configuration Software User’s Guide;* or
- *SenseNET Software User’s Guide*

for more information.

CHAPTER 6
PARTS LIST

6-1 AVAILABLE PARTS

Refer to Table 6-1 below for descriptions and part numbers for the AIR-Intelligence™ ASD-320

Table 6-1. Parts List for the ASD-320

Category	Part Number	Part Name
Units	33-30672A	AIR-Intelligence ASD-320 Detector with Docking Station (Includes: Detector, CD-ROM and 2 Ferrite Beads)
	33-30764A	AIR-Intelligence ASD-320 Detector with Docking Station and Input Relay Card (Includes: Detector, CD-ROM and 2 Ferrite Beads)
Replacement Parts	33-30436A	ASD Input Relay Card
	33-30755A	Replacement AIR-Intelligence ASD-320 Dust Filter Cartridge

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